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(*Crotalus horridus*) from the neighborhood which he kept in a glass case, and maintained a summer temperature the year round, with the result that during that period of three years the snakes did not hibernate, but maintained an active existence during the entire time. He has observed that they have shed their epidermis at shorter periods than has been generally supposed; to wit, about once in three months, and that this is not a constant factor, but will vary. It has popularly been held as an indisputable fact that the rattle-snake adds one joint to the rattle each year, but Mr. Ford has discovered that a new joint is added to the rattle with each shedding of the epidermis, and the snakes in his collection have added from three to four buttons each year, proving that the old time hypothesis is erroneous. The snakes have fine rattles with perhaps ten or twelve buttons and have attained a length of maybe less than twenty inches. In this collection, under the scrutiny of Mr. Ford, is a small mud turtle (species unknown) that is kept at about the same temperature as the snakes but with different results. As winter approaches and the proper season arrives it declines to eat, draws in its head and becomes lethargic and finally falls into a stupor, which lasts till spring when it awakes again to its wonted life and activity. From these facts, it would be interesting to determine what degree of cold a dormant animal may be subjected to without destroying its latent vitality, and what degree of temperature is necessary to induce hibernation in any given animal.

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## ON ONE OR TWO COMMON STRUCTURAL ADAPTATIONS IN FISHES.

The caudal fin of fishes is the chief propelling organ. As such its form is a good criterion of a fish's

habit of locomotion. The forked form is used almost without exception by those species which swim continually through extensive stretches of open water. The water slipping along the fishes flanks must escape backward in the middle line of its tail. Side to side motion of a square caudal would interfere with the backward flow of the water and impede the fish. Obviously the forked fin is better adapted for this work as the central impeding portion is eliminated and the lobes brace against comparatively stationary water. A narrow peduncle is also an advantage and we find the peduncle tending to be more and more narrow particularly in its vertical diameter, and it is often strengthened by keels in its horizontal diameter, that is the plane of its motion. It is interesting that the same type is approached by the mackerels, a free swimming more or less pelagic off-shoot of the Percoid stem, by the mackerel-sharks, most active swimmers of the sharks, which have a very different heterocercal caudal as a basis of variation, and the Cetacea, among mammals. The Cetacea are, interestingly enough, adapted to motion in a different plane, moving their forked caudal up and down instead of from side to side, and with the peduncles narrowed horizontally instead of vertically.

Certain fishes, except when alarmed, propel themselves not by the caudal, but by the breast-fins. Such are the wrasse-parrotfish group, which slip in and out among rocks and the crevices of coral-reefs. These have usually squarish or rounded caudals, quite different from the firm forked ones of more actively free-swimming fishes. Indeed the relative forking is a fair criterion of the amount of swimming that a fish does, the minnows with forked caudals, being more active swimmers than the killifish group with rounded, the sea running salmon having a more forked caudal than the brook inhabiting trout, the old trout a squarer tail than the young, to whom the

same brook furnishes, compared to its size, a wider swimming range.

The evolution in habit and structure which from a group of predaceous free-swimming mammals like the Delphinidae has evolved the large whale-bone whales which feed on small animals sifted from the water with their baleen, is more or less paralleled in several independent groups of fishes. Our common menhaden, representative of the herrings, is a good example. Though a small fish the size and density of the schools in which it swims are in a way analagous with the cetacean's bulk. Continually it swims forward, its mouth wide open, gulping sea-water from which its very fine lengthened gill-rakers are sifting food enough to make it very fat and sought after for its oil. A better example are the gigantic basking shark and whale shark, off-shoots from the active predaceous mackerel sharks. The large gill openings and very small teeth of these largest of fishes, show them to be sifters of small food. In the almost universally predaceous mackerel genus *Scomber* an East Indian species has very long fine gill-rakers, doubtless associated with herring-like feeding habits.

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## CONCLUDING NOTES ON THE SALIENTIA OF JACKSONVILLE, FLA.

*Acris gryllus*, Le Conte, the "Cricket frog," is one of the commonest frogs, great swarms of this species having been seen by the writer during the spring months about the edges of bayous, creeks and ponds. Its rattling notes can be heard during the entire warm season, day and night. Owing to the small size of its adhesive disks, this tree-"frog" cannot climb into trees, but lives on the ground, wandering into fields, meadows and gardens. It attains a length of 1¼ inches from snout to vent, but the